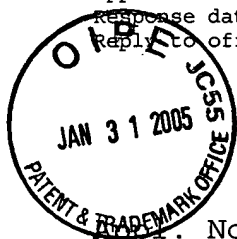


Appl. No. 09/837,503  
Response dated 1-28-05  
Reply to office action of December 28, 2004



*Zor AF*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/837,503 Confirmation No. 8044  
Applicant : Vincent M. Callaghan et al  
Filed : April 18, 2001  
TC/A.U. : 1764  
Examiner : Basia Anna Ridley

Docket No. : 01-104  
Customer No. : 34704

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313

**RESPONSE TO NOTIFICATION OF NON-COMPLIANT APPEAL BRIEF**

Dear Madam:

This paper is submitted responsive to the Notification of Non-Compliant Appeal Brief which was mailed on December 28, 2004. Responsive to that notification, enclosed herewith is a Corrected Appeal Brief which responds to each and every deficiency raised in the aforesaid notification.

Specifically, the enclosed brief contains all proper headings and required components set forth under 37 CFR 41.37(c).


It is noted that the notification in Item 3 indicated that the initially-filed brief did not contain a statement of the status of each such amendment. This in fact was included in the initial brief. That portion is also set forth herein under the proper heading and therefore is believed to be a satisfied requirement.

It is believed that no additional fee is due in connection with submission of this corrected brief. If, however, any fee is due, please charge same to Deposit Account No. 02-0184.



Respectfully submitted,

By

  
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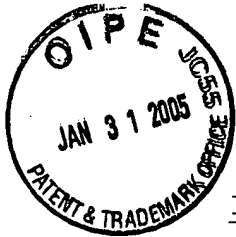
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Date: January 28, 2005

I, Marian R. Capelli, hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313 on January 28, 2005.



Marian R. Capelli



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant : Vincent M. Callaghan et al  
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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313

**APPEAL BRIEF UNDER 37 CFR 41.37**

Dear Sir:

This Appeal Brief is submitted following the Notice of Appeal filed July 9, 2004 and responsive to the Notification of Non-Compliant Appeal Brief mailed December 28, 2004.

**(i) Real party in interest.** The real party in interest in this Appeal is the Assignee of record, namely, UTC Fuel Cells, L.L.C.

**(ii) Related appeals and interferences.** There are no known appeals and/or interferences related to the present appeal.

**(iii) Status of claims.** The case contains claims 1 - 17. Claims 12 - 16 have been withdrawn. Claims 1 - 11, and 17 pending. Of these claims, claim 6 has been allowed, while claims 1 - 5, 7 - 11 and 17 are rejected. The appealed claims are claims 1 - 5, 7 - 11 and 17.

**(iv) Status of amendments.** A response under 37 CFR 1.116 was mailed on April 12, 2004. This response contained an amendment to the specification and was not entered by the Examiner as raising new issues. The only amendment made in this response was to amend the specification to point out that the

abbreviation "PPH" stands for pounds per hour. This specification amendment had been requested by the Examiner, but was then held to raise new issues. Since this abbreviation is well understood by a person of ordinary skill in the art, the appeal can certainly proceed without entry of the subject amendment.

**(v) Summary of claimed subject matter.** The appealed claims include independent claims 1 and 17. The invention relates to a fuel cell system and, more particularly, a fuel processor 12 for a fuel cell system (See generally Figure 1) which converts hydrocarbon fuel into a high temperature reformed gas containing hydrogen, carbon dioxide and carbon monoxide. A first conduit 18 is provided for communicating the reformed gas to a shift converter and a second conduit 22 is provided for communicating the gas stream from the shift converter to the fuel cell. A water source 28 is communicated with either or both of the first and second conduits 18, 22. While claim 1 refers to these elements as "conduit means", these elements are recited with sufficient structure that 112 6th paragraph interpretation is not implemented.

Water feed means are provided for feeding water from the water source to the first and/or second conduits for cooling at least one of the reformed gas and the gas stream, respectively, to a desired temperature. The means for feeding water from the water source in a controlled manner is properly interpreted under 35 USC 112, 6th paragraph, and the structure for performing this function is shown in Fig. 1 as water source 28 with line 42 to a series of valves 46 for injecting the water along conduits 18, 22 as may be desired. This subject matter is discussed throughout the specification, and for example in the

portion bridging page 5 line 9 through page 7 line 5. This is the subject matter of independent claim 1.

A selective oxidizer 24 can advantageously be positioned between the shift converter 20 and the fuel cell 30, and located downstream of where the water feed means feeds water to the first and/or second conduits. This additional subject matter is an added element to independent claim 17 which is in other respects similar to claim 1. Thus, claim 17 calls for the same 112 6th paragraph interpretation as called for in claim 1 discussed above.

Appealed dependent claims contain the following additional subject matter:

Control means (claim 3) are provided for controlling the feed of water to the conduits, and the control means is preferably adapted to sense the temperature of the reformed gas and gas stream, respectively, and to feed water to at least one of the first and second conduits in response to the sensed temperature (claim 4). This is described in the specification at page 6, last line, through page 7, line 5.

Means are provided for collecting water from the fuel cell and recycling at least a portion of the collected water back to the water source (claim 5). See specification page 7, lines 11-14.

The control means can preferably include at least one solenoid valve 46 which opens and closes in response to the sensed temperature (claim 7). See specification page 5, lines 17-21.

The water feed means preferably includes means to atomize the water (claim 8). See specification page 6, lines 6-11.

A high surface area material can be used as a packing in at least one of the first and second conduits, and the water can be fed to this material (claim 9).

Each of the foregoing features of the invention is set forth in one of the claims which stands rejected upon the present appeal.

***(vi) Grounds of rejection to be reviewed on appeal.***

**A. The first ground of rejection** to be reviewed on appeal is the rejection of claims 1, 2, 5 and 11 as anticipated by U.S. Patent No. 4,473,622 to Chludzinski et al.

**B. The second ground of rejection** to be reviewed on appeal is the rejection of claims 3, 4, 7 and 8 as obvious based upon Chludzinski et al combined with U.S. Patent No. 4,042,016 or U.S. Patent No. 3,651,641.

**C. The third ground of rejection** to be reviewed on appeal is the rejection of claims 9 and 10 as obvious based upon Chludzinski et al combined with U.S. Patent No. 4,530,886 to Sederquist.

**D. The fourth ground of rejection** to be reviewed on appeal is the rejection of claim 17 as obvious based upon Chludzinski et al combined with U.S. Patent No. 3,982,962 to Bloomfield.

***(vii) Argument***

**A. First ground of rejection**

Chludzinski et al clearly does not teach each and every feature of claims 1, 2, 5 or 11 as asserted by the Examiner. Thus, this rejection is in error and should be reversed.

Turning to claim 1, claim 1 is drawn to a fuel cell system and requires, among other elements, a water feed means for feeding water from the water source to at least one of the first

and second conduit means in a controlled manner for cooling at least one of the reformed gas and gas stream, respectively, to a desired temperature. This claim element is set forth in means plus function format and is properly interpreted following the requirements of 35 U.S.C. 112, 6<sup>th</sup> paragraph. Thus, this limitation is properly interpreted as covering the structure disclosed in the specification for performing the claimed function, and structures which are equivalent thereto.

The structure disclosed in the specification for feeding water from the water source to the conduit means in a controlled manner for cooling to a desired temperature includes a water feed line 42 to a particular conduit 18, 22, and the feeding in a controlled manner is carried out by mixing liquid water with the stream. This liquid water is indicated in the specification as the vehicle for cooling, as the appreciable and important portion of the cooling is done through evaporation of the liquid water.

In meeting this structure, the Examiner pointed to Chludzinski and the water vapor transporting membrane positioned between two different lines of the system. This membrane is said to pass water vapor from the anode exhaust to the higher temperature reformat stream thereby drying the hydrogen and partially humidifying the reformat.

Thus, the disclosure of Chludzinski is a membrane which transports water in vapor state from one line to another. No mechanism is disclosed for making this transport in a controlled manner. It is respectfully submitted that this disclosure is clearly not within the scope of the limitation of claim 1. Specifically, claim 1 when properly interpreted under 35 U.S.C. 112, 6<sup>th</sup> paragraph is not met by a water vapor transport membrane. Chludzinski may inherently cool the higher

temperature stream, but in a different and non-equivalent manner to that set forth in the specification. Further, nothing in Chludzinski discloses or suggests controlling the amount of water based upon temperature of the stream into which the water is being added.

Based upon the foregoing, Chludzinski clearly fails to meet each and every limitation of independent claim 1, and therefore, does not anticipate same. Reversal of this ground of rejection is therefore proper and respectfully requested.

Dependent claim 2 calls for the water added to the reformed gas to set a desired oxygen/carbon ratio for the shift converter. Any water transported with the structure of Chludzinski, it is respectfully submitted, would be problematic in terms of attempting to set the desired oxygen/carbon ratio for the shift converter as set forth in claim 2.

In connection with claim 5, it is respectfully submitted that Chludzinski et al clearly fails to disclose means for collecting water from the fuel cell and recycling at least a portion of the collected water to the water source. This rejection, too, is in error as the reference fails to disclose each and every feature of claim 5 combined with independent claim 1.

Turning to claim 11, claim 11 further modifies the means for feeding water structure of claim 1 to indicate that water is fed to both the first and second conduits. Chludzinski et al clearly fails to disclose the subject matter of this element of the claims, in similar fashion to that set forth in connection with claim 1 above. Specifically, Chludzinski et al clearly does not disclose the structure for accomplishing this function which is set forth in the specification, or any equivalent thereto, and therefore fails to meet this claim limitation under



35 U.S.C. 112, 6<sup>th</sup> paragraph. Claim 11 is therefore allowable over the art of record, and this rejection should be reversed.

**B. Second ground of rejection**

The subject matter of claims 3 - 4 and 7 - 8 is not obvious based upon Chludzinski et al in view of either Boochever et al or Ginter. Claim 3 depends from claim 1 discussed above and calls for the water feed means to include control means for controlling the feeding of water to at least one of the first and second conduit means, and claim 4 specifies that the control means senses temperature of the reformed gas and gas stream, respectively, and feeds water to the first and second conduits based upon the sensed temperature.

The secondary references relied upon by the Examiner in meeting the subject matter of claims 3 and 4 are drastically different and unrelated to the primary reference. Boochever et al is drawn to an environmental humidification and cooling system which includes an ultrasonic spray nozzle. Humidification in this system is effected by spraying atomized water with the ultrasonic nozzle into the suction chamber of a fan.

In a different direction, but equally strikingly different, Ginter is drawn to an engine system and thermogenerator therefore. Specifically, Ginter is drawn to a combustion engine and uses a water line to supply atomized water to the combustion chamber of that device.

It is respectfully submitted that a person of ordinary skill in the art would not consult either Boochever et al or Ginter in any way in connection with modifications to be made to the Chludzinski et al reference, and especially not to modify the membrane of Chludzinski et al to somehow arrive at the claimed control means for controlling feed of water to the first

and second conduits. This is also true as to the further function of claim 4 wherein the controls means senses temperature. Thus, it is respectfully submitted that the rejections of claim 3 and 4 are fundamentally flawed as based upon hindsight reconstruction and inappropriate combination of references, and should be reversed.

This ground of rejection is also clearly deficient for the reasons supporting reversal of the first ground of rejection since the claims subject to this ground of rejection depend from independent claim 1.

As to claims 7 and 8, each of these claims recites subject matter which is further patentable over the art of record. Specifically recited are a solenoid valve for the control means and means to atomize water as part of the water feed means, respectively. These claims, likewise, are said to be met by the combination of Chludzinski et al with either Boochever or Ginter as discussed above. It is respectfully urged that this combination is fundamentally in error, and this ground of rejection should be reversed.

### **C. Third ground of rejection**

As to claims 9 and 10, the Examiner concedes that Chludzinski et al does not disclose the inclusion of a packing of high surface area material, with water being fed to the material. Of course, Chludzinski et al likewise must not disclose what the material is, by definition.

The Examiner instead cites the Sederquist patent as teaching that the efficiency of humidification of a gas stream can be increased by using a packing of high surface area material with water being fed into the material. This rejection fails to meet the subject matter of claims 9 and 10,

respectively, by clearly still failing to meet the limitations of main claim 1 in connection with means for feeding water. Further, Sederquist does not contain any teaching which would lead one of ordinary skill in the art to be motivated to combine the teachings pointed out by the Examiner from Sederquist with the primary reference to Chludzinski et al. This ground of rejection is therefore in error and should be reversed.

**D. Fourth ground of rejection**


In connection with independent claim 17, the Bloomfield reference is used by the Examiner to support teaching of a selective oxidizer as set forth in the additional limitation of independent claim 17. It is respectfully submitted, however, that Bloomfield contains no teaching whatsoever which cures the deficiency in the base rejection drawn to means for feeding water, which clearly is not met in the Chludzinski et al. reference. Thus, based upon the reasons for reversing the first ground of rejection set forth above, this ground of rejection is likewise in error and should be reversed.

Based upon the foregoing, it is clear that the grounds of rejections of record which have been made final by the Examiner are in error and should be reversed. Further, the claims as currently pending are submitted to be patentable over all art of record, and allowance of the application is therefore respectfully and earnestly solicited.

**(viii) Claims appendix** Attached hereto is an appendix containing a copy of the claims involved in this appeal.

The fee for filing an Appeal Brief was previously submitted with the brief held to be non-compliant. It is believed that no additional fee is due. However, if any fee is due, please charge same to Deposit Account No. 02-0184.

Respectfully submitted,  
UTC Fuel Cells, L.L.C.

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I, Marian R. Capelli, hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Appeal Brief-Patents "Commissioner for Patents" P.O. Box 1450, Alexandria, VA 22313-1450 on January 28, 2005

Marian R. Capelli

## Claims appendix

1. A fuel cell system comprising a fuel processor for converting a hydrocarbon fuel into a high temperature reformed gas containing hydrogen, carbon dioxide and carbon monoxide, first conduit means for communicating the reformed gas to a shift converter located downstream of the fuel processor for further converting the reformed gas to primarily a hydrogen and carbon dioxide containing gas stream, second conduit means for communicating the gas stream to a fuel cell downstream of the shift converter for reacting the hydrogen in the gas stream, a water source, and water feed means for feeding water from the water source to at least one of the first and second conduit means in a controlled manner for cooling at least one of the reformed gas and gas stream, respectively, to a desired temperature.

2. A fuel cell system according to claim 1, wherein the water added to the reformed gas sets the desired oxygen/carbon ratio for the shift converter.

3. A fuel cell system according to claim 2, wherein the water feed means includes control means for controlling the feeding of water to at least one of the first and second conduit means.

4. A fuel cell system according to claim 3, wherein the control means senses the temperature of the reformed gas and gas stream, respectively, and feeds water to at least one of the first and second conduits, respectively, in response to the sensed temperature.

5. A fuel cell system according to claim 1, further including means for collecting water from the fuel cell and recycling at least a portion of the collected water to the water source.

6. (allowed and not appealed) A fuel cell system comprising a fuel processor for converting a hydrocarbon fuel into a high temperature reformed gas containing hydrogen, carbon dioxide and carbon monoxide, first conduit means for communicating the reformed gas to a shift converter located downstream of the fuel processor for further converting the reformed gas to primarily a hydrogen and carbon dioxide containing gas stream, second conduit means for communicating the gas stream to a fuel cell downstream of the shift converter for reacting the hydrogen in the gas stream, a water source, and water feed means for feeding water from the water source to at least one of the first and second conduit means in a controlled manner for cooling at least one of the reformed gas and gas stream, respectively, to a desired temperature, wherein the water added to the reformed gas sets the desired oxygen/carbon ratio for the shift converter, further including at least one selective oxidizer, between the shift converter and the fuel cell, and located downstream of where the water feed means feeds water to the second conduit means.

7. A fuel cell system according to claim 4, wherein the control means further includes at least one solenoid valve which opens and closes in response to the sensed temperature.

8. A fuel cell system according to claim 3, wherein the water feed means includes means to atomize the water.

9. A fuel cell system according to claim 2, wherein at least one of the first and second conduit means includes a packing of high surface area material and the water is fed to the material.

10. A fuel cell system according to claim 9, wherein said high surface area material is selected from the group consisting of ceramic pellets, steel wool, reticulated ceramic foam, metal foam, and honeycomb monoliths.

11. A fuel cell system according to claim 2, wherein water is fed to both the first conduit and the second conduit.

12-16. (withdrawn).

17. A fuel cell system, comprising:

a fuel processor for converting a hydrocarbon fuel into a high temperature reformed gas containing hydrogen, carbon dioxide and carbon monoxide;

first conduit means for communicating the reformed gas to a shift converter located downstream of the fuel processor for further converting the reformed gas to primarily a hydrogen and carbon dioxide containing gas stream;

second conduit means for communicating the gas stream to a fuel cell downstream of the shift converter for reacting the hydrogen in the gas stream; and

water feed means for feeding water to at least one of the first and second conduit means in a controlled manner for

cooling at least one of the reformed gas and gas stream,  
respectively, to a desired temperature; and

at least one selective oxidizer positioned between the  
shift converter and the fuel cell, and located downstream of  
where the water feed means feeds water to the at least one of  
the first and second conduit means.